

蹄盖蕨科的亚科划分*

王中仁

(中国科学院植物研究所系统与进化植物学开放研究实验室, 北京 100093)

A SUBDIVISION OF THE FAMILY

ATHYRIACEAE ALSTON

Wang Zhong-ren

(Laboratory of Systematic and Evolutionary Botany, Institute of Botany, Chinese Academy of Sciences, Beijing 100093)

Abstract The classification of ferns has been improved by the foundation of the family Athyriaceae. But even according to Ching's strict concept, it is still a large and complex taxon. After Ching distinguished it into 21 genera, the family has become clear at the generic level. Up to now, the subdivisions at the levels of subfamily, subgenus and section are still unsuccessful. Mainly according to the three basic chromosome numbers, $X = 42, 41$ and 40 , along with the position of sori and other morphological characters, the family is divided into three subfamilies: Cystopterioideae, Athyrioideae and Diplazioideae in the present paper.

Key words Taxonomy; Pteridophyte; Athyriaceae; Cystopterioideae; Athyrioideae; Diplazioideae

摘要 蹄盖蕨科的建立对蕨类植物的分类起了很大的推动作用,然而,即使按秦仁昌的狭义概念,它仍然是一个极其复杂的大科。自秦仁昌把该科划分为 21 个属以后,属级水平上的分类问题比较清楚了,但亚科、亚属和组的划分至今仍不成功。本文主要根据该科三个染色体基数 $X = 42, 41$ 和 40 , 结合孢子囊群着生的位置及其它形态特征,将其划分为 3 个亚科:冷蕨亚科、蹄盖蕨亚科和双盖蕨亚科。

关键词 分类学;蕨类植物;蹄盖蕨科;冷蕨亚科;蹄盖蕨亚科;双盖蕨亚科

蹄盖蕨科 Athyriaceae 是秦仁昌(1954)首先提出来的,当时为裸名,后来由 Alston (1956)正式发表了。然而,Alston 在对本科给予拉丁描述使其合法化时扩大了其原有的概念,把秦仁昌(1940)以裸名发表的球子蕨科 Onocleaceae Ching ex Pic.-Serm. 和岩蕨科 Woodsiaceae Ching ex Herter 也包括了进去,这两个科后来先后都被承认并合法发表了;Löve 等(1977)把金星蕨科的毛脉蕨属 *Trichoneuron* Ching、肿足蕨科的肿足蕨属 *Hypodematum* Kunze 和热带美洲的两个属 *Adenoderris* J. Smith ($X = ?$)、*Hemidictyum* C. Presl ($X = 31$)也放在了蹄盖蕨科,扩大了秦的概念,后两个热带美洲属的系统位置至今未定,放在蹄盖蕨科显然是勉强的;Tryon & Tryon(1982)和 Kato & Kramer (1990)则把广义的蹄盖蕨科放入了广义鳞毛蕨科下的岩蕨族 Tribe Physmatieae, Kato &

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Kramer(1990)在这两个等级中间还增加了蹄盖蕨亚科 *Athyrioideae*。本文按秦仁昌(1978)的蹄盖蕨科概念,不包括上述科或属。蹄盖蕨科的建立是一个很大的进步,然而,即使按秦仁昌(1978)的狭义概念,该科仍是一个庞大而复杂的蕨类植物类群。孢子囊群及囊群盖的形态是蕨类植物最重要的分类依据,而它们在蹄盖蕨科中是多变的,有的种类甚至无囊群盖。后来,秦仁昌将该科划分成为 21 个属(秦仁昌,1978;秦仁昌、王中仁 1982),使其在属的等级上的划分初步清晰。到目前为止,对于这样一个庞杂的类群虽然已有一些分类学工作,如:Sledge(1962)、秦仁昌(1964)、Bir(1973)、Kato(1977,1984)等,但由于其大多数种类分布在中国及喜马拉雅地区,国外学者的研究的材料有限,许多类群的调查工作也存在不少空缺,“对该科的亚科、亚属和组的划分尚未获得成功”(吴兆洪、秦仁昌,1991;吴兆洪,1984;秦仁昌,1978)。

随着细胞学资料的积累(Bhavanandan, 1968; Bir, 1973; Löve *et al.*, 1977; Tsai & Shieh, 1978; Iwatsuki, 1992 等),蹄盖蕨科显示出不同属之间具有相同或不同的染色体基数,并且细胞学特征与形态特征有一定的相关性,因此,我们有理由把它们聚合为自然的类群。作者在先师秦仁昌生前曾和他讨论过亚科的划分问题,并初步达成了共识,认为以三个不同的染色体基数($X=40, 41, 42$)为主要依据,结合孢子囊群的形态和着生情况等特征,可以比较自然地把该科划分为三个亚科:蹄盖蕨亚科、双盖蕨亚科和冷蕨亚科,这个观点在秦仁昌和本文作者共同发表的文章中(1982)已经以裸名形式提到,但一直没有进行拉丁描述。本文对蹄盖蕨科各亚科的鉴别特征进行描述。对于目前尚缺细胞学资料的属(光叶蕨属 *Cystoathyrium* 和毛子蕨属 *Monomelangium*),作者把它们暂时归入一个形态特征上最接近的亚科。

The family *Athyriaceae* was first proposed by Ching (1954) in a nude name. Alston validated it in 1956, but he enlarged Ching's original concept by lumping *Onocleaceae* Ching ex Pic. Serm. and *Woodsiaceae* Ching ex Herter under the name *Athyriaceae*. Löve *et al.* (1977) put *Trichoneuron* Ching (*Thelypteridaceae*), *Hypodematium* Kunze (*Hypodematiaceae*) as well as two tropical American genera *Adenoderris* J. Smith ($X=?$), *Hemidictyum* C. Presl ($X=31$), whose systematic position are still uncertain, in the family. Ching's concept was thus further enlarged. Tryon & Tryon (1982) and Kato & Kramer (1990) put *Athyriaceae* s. l. in *Dryopteridaceae* s. l. under Tribe *Physematieae* and a subfamily *Athyrioideae* was set by Kato & Kramer (1990). However, in the present paper we follow Ching's concept for *Athyriaceae* (1978), and thus the above-mentioned families or genera are not included. The classification of ferns has been improved by the foundation of the family *Athyriaceae*. But, even according to Ching's strict concept of *Athyriaceae*, it is still a large and complex taxon. The forms of sori and indusia are usually the most important criteria in the fern taxonomy, but in this taxon they are variable and indusia may even be absent. After Ching distinguished it into 21 genera (Ching, 1978; Ching and Wang, 1982), the family has become clear at the generic level. For the reason that most species of this family occur in China and the Himalayan area, the materials examined by the foreign pteridologists were limited or not enough. Up to now, although some taxonomic works have been done for this

family, e. g. Sledge (1962), Ching (1964), Bir (1973), Kato (1977, 1984), "the subdivisions at the levels of subfamily, subgenus and section are still unsuccessful" (Ching, 1978; Wu, 1984; Wu & Ching, 1991). Along with the increase of cytological evidence (Bhavanandan, 1968; Bir, 1973; Löve *et al.*, 1977; Iwatsuki, 1992 etc.), it is getting more and more clear that some genera share the same basic chromosome number and some others different in this respect. Difference in cytology are often correlated with those in numbers of morphological characters. Consequently, we can cluster them into different taxa. We consider that mainly according to the three basic chromosome numbers, $X = 42, 41$ and 40 , along with the position of sori and other morphological characters, three subfamilies may be recognized under Athyriaceae, i. e. Cystopterioideae, Athyrioideae and Diplazioideae. This subdivision was mentioned in our paper of 1982 (Ching & Wang, 1982) in nude name. For making it valid, giving them a Latin diagnosis is necessary. Two genera, *Cystoathyrium* and *Monomelangium* without cytological information till now will be temporarily put in the morphologically nearest subfamily.

蹄盖蕨科 Athyriaceae Alston in Taxon **5**:25. 1956; Ching in Acta Phytotax. Sin. **3** (1):96. 1954, nom. nud. et in l.c. **9**:41. 1964 et in l.c. **16**:12. 1978. —Tribe *Physematieae* Tryon & Tryon (Dryopteridaceae), Ferns and Allied Plants. 542. 1982, pro parte; Kato et Kramer in K. Kubitzke (Ed.), Famil. & Gen. Vasc. Pl. **1**:131. 1990, pro parte.

Three subfamilies are included.

本科包括 3 个亚科

冷蕨亚科 Subfam. 1. **Cystopterioideae** Ching et Z. R. Wang, subfam. nov.; id. in Acta Phytotax. Sin. **20** (1):73. 1982 [(Cystopterioideae (pro nom. subfam.))], nom. nud.

Planta mediocris vel parva. Rhizomatibus gracilibus late vel breviter repentibus; laminis bipinnatis vel tripinnato-pinnatifidis; soris parvis, globosis, in dorso venularum positis; indusiis ovato-lanceolatis, ovatis vel oblatis, basibus extremorum roundorum in sorophoris positis, saepe subter soros maturos similiter inferis; venis liberis; numero basico chromosomatum 42.

Typus subfamiliae: 冷蕨属 *Cystopteris* Bernh.

本亚科包括 3 属: 亮毛蕨属 *Acystopteris* Nakai, 冷蕨属 *Cystopteris* Bernh., 光叶蕨属 *Cystoathyrium* Ching.

中小形植物; 根状茎细长横走或短横卧; 叶为一至二回羽状复叶, 羽片或小羽片羽裂; 孢子囊群圆形, 着生在叶脉背上; 囊群盖卵状披针形、卵形或扁圆形, 以圆端基部着生于囊群托上, 常被成熟的孢子囊群压在下面, 犹如下位; 叶脉分离; 染色体基数 $X=42$ 。

蹄盖蕨亚科 Subfam. 2. **Athyrioideae**; Ching et Z. R. Wang in Acta Phytotax. Sin. **20**(1): 73. 1982 [(Athyrioideae (pro nom. subfam.))], nom. nud.

Planta parva vel grandis. Rhizomatibus erectis, ascendentibus vel repentibus; laminis pinnatis vel 2~3-pinnato-pinnatifidis; soris saepe hippocrepiformibus, curvatis, breviter linearibus, lunulatis, reniformibus vel oblongis, interdum multiformibus in eadem planta, etiam

in eadem fronde aut eodem segmento, in lateribus aut dorsis venularum sitis, aut athyrioides, raro in vena basali acroscopica diplazioideis; indusiis conformibus; venis liberis, raro anastomosantibus; numero basico chromosomatum 40.

Typus subfamiliae: 蹄盖蕨属 *Athyrium* Roth

本亚科包括 10 属: 羽节蕨属 *Gymnocarpium* Newman, 拟鳞毛蕨属 *Kuniwatsukia* Pic.-Serm., 安蕨属 *Anisocampium* Presl, 假冷蕨属 *Pseudocystopteris* Ching, 介蕨属 *Dryoathyrium* Ching, 蛾眉蕨属 *Lunathyrium* Koidz., 假蹄盖蕨属 *Athyriopsis* Ching, 蹄盖蕨属 *Athyrium* Roth, 新蹄盖蕨属 *Neoathyrium* Ching et Z. R. Wang, 轴果蕨属 *Rhachidosorus* Ching.

小至大形植物;根状茎直立、斜升或横走;叶为一至多回羽状复叶;孢子囊群通常为马蹄形、弯钩形、短线形、新月形、肾形或矩圆形等多种形状,有时多种形状的孢子囊群存在于同一植株,甚至同一叶片或裂片上,半侧半背生(蹄盖蕨型)、侧生或背生在叶脉上,少有在基部上侧一脉为双生;囊群盖同形;叶脉分离,偶有网结;染色体基数 $X=40$ 。

双盖蕨亚科 Subfam. 3. **Diplazioideae** Ching et Z. R. Wang, subfam. nov.; id. in Acta Phytotax. Sin. 20(1):73. 1982 [(Diplazioides(pro nom. subfam.))], nom. nud.

Planta mediocris vel grandis. Rhizomatibus late vel valide repentibus, ascendentibus vel erectis; laminis simplicibus vel 1~3-pinnatis; soris rectis haud curvatis, vulgo allantoideis, linearibus, lunulatis vel oblongis, in latere anteriore venarum positis, in vena basali acroscopica saepe diplaziodeis; indusiis conformibus aut raro nullis; venis liberis vel conniventibus, consociatis aut reticulatis; numero basico chromosomatum 41.

Typus subfamiliae: 双盖蕨属 *Diplazium* Sw.

本亚科包括 7 属: 角蕨属 *Cornopteris* Nakai, 短肠蕨属 *Allantodia* R. Br., 菜蕨属 *Callipteris* Bory, 双盖蕨属 *Diplazium* Sw. [incl. *Triblemma* (J. Smith) Ching], 肠蕨属 *Diplaziopsis* C. Chr., 网蕨属 *Dictyodroma* Ching, 毛子蕨属 *Monomelangium* Hayata.

中大形植物;根状茎长横走、短横卧、直立或斜升;叶为单叶至多回羽状复叶;孢子囊群直线形,从不弯弓,通常为短肠形、线形、新月形或矩圆形,侧生在叶脉上,有时双生一脉;囊群盖同形,少有无囊群盖;叶脉分离或有靠合、连接或形成网眼;染色体基数 $X=41$ 。

参 考 文 献

- 吴兆洪, 1984. 秦仁昌系统(蕨类植物门)总览. 广西植物, 4(4):300~301
吴兆洪, 秦仁昌, 1991. 中国蕨类植物科属志. 北京:科学出版社, 270~314
秦仁昌, 1954. 中国蕨类植物科属名词及分类系统. 植物分类学报, 3(1):96
秦仁昌, 1964. 关于蹄盖蕨科的一些分类问题. 植物分类学报, 9(1):41~84
秦仁昌, 1978. 中国蕨类植物科属的系统排列和历史来源. 植物分类学报, 16(3):4~5, 12
秦仁昌, 王中仁, 1982. 关于亚洲东北部产细齿蹄盖蕨的分类位置问题. 植物分类学报, 20(1):73~77
Alston A G H, 1956. The subdivision of Polypodiaceae. Taxon, 5:23~25
Bhavanandan K V, 1968. Studies on the cytology of sixteen species of south Indian ferns. Caryologia, 21:333~338

- Bir S S, 1973. Evolution and inter-relationship of Athyroid and Diplazioid genera of ferns. In: Kachroo P. ed. *Advancing Frontiers in Cytogenetics*. Delhi: Hindustan Publ Corp, 286~292
- Ching R C, 1940. On natural classification of the family "Polypodiaceae". *Sunyatsenia*, **5**(4):201~268.
- Iwatsuki K, 1992. *Ferns and Fern-Allies of Japan*. Tokyo: Heibonsha, 232~233
- Kato M, 1977. Classification of *Athyrium* and allied genera of Japan. *Bot Mag Tokyo*, **90**:23~40
- Kato M, 1984. A taxonomic study of the Athyroid fern genus *Deparia* with Main reference to the Pacific species. *J Fac Sci Univ Tokyo III*, **13**:375~429
- Kato M, Kramer K U, 1990, In: Kubitzke K ed. *The Families and Genera of Vascular Plants*. New York: Springer-Verlag, **1**:131~140
- Löve A, Löve D, Pichi Sermolli REG, 1977. *Cytotaxonomical Atlas of the Pteridophyta*. Vaduz: J Cramer, 269~300
- Sledge W A, 1962. The Athyroid ferns of Ceylon. *Bull Brit Mus (Nat Hist) Bot*, **2**(11):277~322
- Tryon R M, Tryon A F, 1982. *Ferns and Allied Plants*. New York: Springer-Verlag, 542~581
- Tsai J L, Shieh W C, 1978. Chromosome numbers of the fern family Aspidiaceae (sensu Copeland) in Taiwan (3). *J Sci Engineer*, **15**:86